



Daffodil International University
Faculty of Science & Information Technology
Department of Software Engineering
Final Examination, Spring 2025

Course Code: SE234; Course Title: Theory of Computing

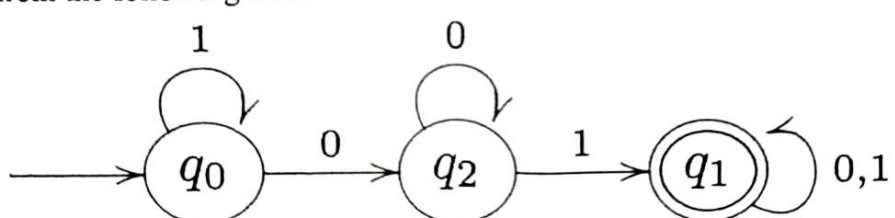
Sections & Teachers: FBR (A,B,C,D), FJT (E, F, G, H), RJM (I)

Time: 2:00 Hrs

Marks: 40

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a)	Demonstrate the regular language for the following expression and show one supported and one not supported string: $0^* (100^*)^*$	[Marks-3]	CLO-3 Level-3
	b)	L1) Discover regular expressions corresponding to the language of the binary alphabet where strings have length at least 4 and its third symbol from the right end will not be 1. L2) Discover a Regular expressions defined over $\{a, b, c\}$ for Language $\{\epsilon, c\}$	[Marks-5]	
	c)	Apply state elimination method to discover the Regular expression from the following DFA 	[Marks-5]	
	d)	Examine whether the given grammar is ambiguous or not- $S \rightarrow AB / aaB$ $A \rightarrow a / Aa$ $B \rightarrow b$	[Marks-3]	
	e)	i) Construct context free grammars to accept the following languages. $\Sigma = \{0, 1\}$ $\{w \mid w \text{ starts and ends with the different symbol}\}$ ii) Construct a CFG that generates the language:	[Marks-5]	

		$L(G) = \{a^n b^m c^m d^{2n} \mid n \geq 1, m \geq 2\}$.		
	f)	Consider the following Context free grammar and evaluate any derivation and parse tree for the string <u>acbd</u> . $S \rightarrow AB$ $A \rightarrow c \mid aA$ $B \rightarrow d \mid bB$	[Marks-4]	
	g)	Illustrate a Non deterministic finite automata for the following regular expression by using the Lemma method. $a^*(a+b)^+b + ab$	[Marks-5]	
	h)	Construct a Push down Automata for the following language: $L = \{a^n b^m c^m d^n \mid n, m \geq 1\}$	[Marks-5]	
2.	a)	Picture a Turing Machine graphically over $\Sigma = \{a, b\}$ for the language, $L = \{w \mid w \text{ contains } baa\}$	[Marks-2]	CLO-4 Level-3
	b)	Turing machines are theoretical models of computation that can be used to define what problems are computationally decidable. Summarize the initial configuration of the Turing machine by mentioning the operations on the tape.	[Marks-3]	